Software Control for FTLRS, the French Transportable Laser Ranging Station

M.Pierron, Observatoire de la Côte d'Azur -Avenue Nicolas Copernic - 06130 Grasse - France Voice : 33 493405420; Fax : 33 49340541; Email : monique.pierron@obs-azur.fr F.Pierron. Observatoire de la Côte d'Azur



FTLRS in Corsica during

Jason-1 calibration campaign - 01 to 09/2002 -

Embedded real time software control

is managed by a remote LINUX station

<u>Abstract</u>: The FTLRS is now in a new version, specially designed for the actual mission (Calibration campaign in Corsica for the oceanic satellite JASON-1); Embedded real time software control is managed by a remote LINUX station.

During tracking, a lot of command is now available (laser power setting, telescope tracking, fast swapping between two "near" satellites like Jason/Topex, ...).

Automatic detection of valid echoes is achieved; many hardware survey and test have been added during tracking phase.

It is now possible to operate on FTLRS from our Grasse facilities, for software maintenance, improvement test and eventually for tracking (after on site station setup by an operator).

FTLRS Control Synoptic

- ▶ a LINUX station for GUI
- a VME system for real time control

Main Control

Before tracking

• Verify Station hardware

• Send previsions

During Tracking

- Read Observation's results
- Plot observation's data
- Get operator commands

Ethernet Link

Track ball

Ethernet Link

International network

Real time multitasking
System

Meteo station

Meteo station

Real Timing card

Range gate card

Chemonator

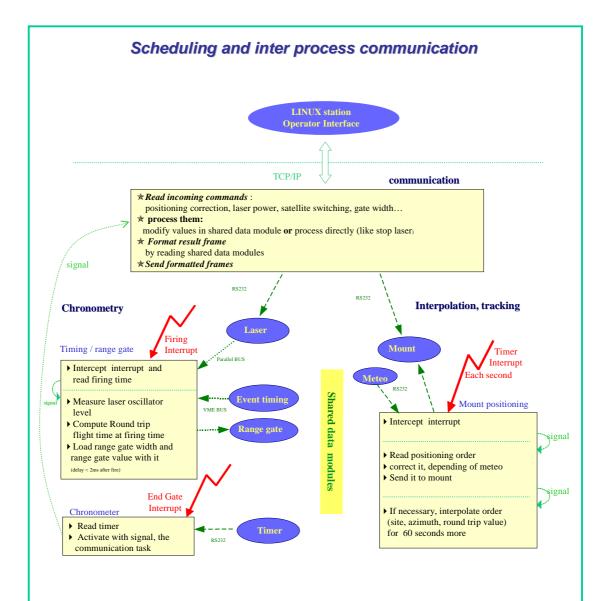
▶ An automatic Control for

meteo, GPS, laser, tracking, container temperature,

- A commands acquisition interface to modify or set laser power, tracking, bias,...
- ▶ A fast switching capability (less 10 sec.) between "near" satellites: Topex/Jason, GraceA/GraceB
- ▶ An automatic detection of valid echoes

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The French Transportable Lasen Ranging Station



Processing Schedule is done with 3 hardware interrupts:

- Firing interrupt, to get start time
- End of range gate interrupt, to get measured round trip time
- Timer interrupt, to send positioning order to the mount:

$\textbf{Synchronization of other process is done with software interrupts} \ (signal)$

- process having to compute "exact" roundtrip time prevision, and to load range gate value and width, is activated by signal after Firing Interrupt
- communication process is activated after end of range gate interrupt
- process having to send positioning order is activated by signal after timer interrupt
- process having to interpolate previsions (site, azimuth, distance) is activated by signal by the previous one

Inter process Communication

is done via shared data modules

Measurement Precision

fire time 100 nanoseconds Roundtrip flight time: some picoseconds

The French Transportable Laser Ranging Station



This Motif GUI, written in C is very simple to use:

- Valid returns are plotted in red color with a more or less acute bell, depending on time bias continuity.
- Time bias is computed in real time and adjusted if necessary.
- Hardware control is done with blinking value if not OK (too hot, ...)
- A lot of commands are available: to modify mount positioning (tracking ball), range gate width, bias in time and range, laser power (Fkey), to switch from one satellite to an other (with near trace), ...